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ON

# LIFE AND ITS LESSONS:

BEING THE

## INAUGURAL ADDRESS

DELIVERED TO THE

BRISTOL MEDICO-CHIRURGICAL SOCIETY,

IN THE

*SESSION* 1882-83,

BY

JAMES GEORGE DAVEY, M.D.

(Member of the Royal College of Physicians, London, etc.),

PRESIDENT OF THE SOCIETY.

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> "*Speak thou the truth: let others fence*
> "*And trim their words for pay:*
> "*In pleasant sunshine of pretence*
> "*Let others bask the day.*"—DEAN ALFORD.

Bristol:
JAMES FAWN AND SON, QUEEN'S ROAD.

1883.

# DR. DAVEY ON THE GANGLIONIC NERVOUS SYSTEM.

*Vol.* I., *8vo., pp.* 309.

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Its STRUCTURE, FUNCTIONS, and DISEASES. By JAMES GEORGE DAVEY, M.D., Member of the Royal College of Physicians, London; formerly Medical Superintendent of the Asylums at Hanwell and Colney Hatch, Middlesex.

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London: J. & A. CHURCHILL, New Burlington Street.

# ERRATA.

For "*Contraversionalist*" read "*Controversialist*," pp. 4 & 7.

For "*in the year*" read "*in this year*," p. 4.

For "*we desire*" read "*I desire*," p. 5.

For "*at our disposal*" read "*at my disposal*," p. 5.

For "*clerical and medical profession*" read "*clerical and medical professions*," note, p. 8.

For "*Versalius*" read "*Vesalius*," note, p. 8.

For "*in each kind*" read "*each kind*," p. 9.

For "*you alone*" read "*he alone*," note, p. 9.

For "*Sciology*" read "*Sociology*," p. 18.

For "*they must*" read "*he must*," p. 20.

For "*affection*" read "*affections*." p. 21.

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# ON LIFE AND ITS LESSONS.

THERE is no single class of men to which the annexed advice of a great poet (Pope) is not of importance. Such advice is very especially applicable to the class medical. The pursuits and studies of those in the medical profession carry them so close to the "*unknowable*," that it is right to remind all such that they will do well to

> "Presume not infinity to scan,"

but to bear ever in mind that—

> "The proper study of mankind is man."

The contents of the following pages will demonstrate how sadly Pope's advice has been to this time neglected by physicians; and with the result of much loss to science—or, what is the same thing, to truth. That mind, pre-occupied with popular fallacies, is in no state to fairly investigate or search for the hard facts of physiology, hence it has come to pass that not a few doctors are seen to commit themselves to opinions in no sense harmonizing with the time—*i.e.* with *this Nineteenth Century*. What is merely traditional must be looked on with no little suspicion and mistrust; he who does this is in the right road to cover the many difficulties in the path of progress—and to reach that higher platform which is the destiny of man—in possibly a not distant future.

The history of biological science will be ever incomplete with no reference to the famous "*Lectures on Man*," from the pen of the late Sir WILLIAM LAWRENCE, delivered in the early part of this century, at the Royal College of Surgeons of England. These lectures are well known and remembered on account, not only of the lively antagonism evoked between their author and the famous ABERNETHY; but because also they advocate, with much force and earnestness, the doctrine of materialism—pure and simple. Sir WILLIAM LAWRENCE would seem to have started into a renewed life the question then as now pending between materialism and immaterialism. Now the importance of LAWRENCE'S views, the direct relationship they hold to physiology, to the laws of health and to sanitary matters in general; as well as to the laws of heredity—including, as a matter of course, the moral laws, their near bearing on the means of progress, by which is meant, the well being and happiness of all men and women—or, in a word, humanity: the importance of LAWRENCE'S views it is clear should claim the first attention of thinkers, in the year of grace 1883.

There is no concealing the fact that there are now to the fore no ordinary contraversionalists—men of mark withal, and taking rank as physiologists; who are using their best endeavours to stamp out, to ignore the materialistic views of the new school of thought; and to replace them with the metaphysical and old fashioned theories of the early and ignorant times; theories now in process of decay and annihilation, in common with the thousand and one superstitions which so surely sufficed for our benighted forefathers. The contraversionalists alluded to accept the fact as above expressed, that—"the *proper study of mankind is man*," but they insist on enveloping their studies in so dense a cloud of assumption and mysticism that truth is nowhere to be found. Their reason is beclouded with a wild imagination—and so it is they are lost in their delusions—and, like the many recognized as "*crazed*," are really objects of our compassion and sympathy.

It may surprise many to be told that among the said contraversionalists are to be found Drs. CARPENTER, WINN, and BARCLAY, including others—who, though non-medical—are equally zealous in the cause of error.

Now the first number of the "*Modern Review*" which made its appearance on the 1st January, 1880, has in it an article from the pen of Dr. CARPENTER, with this title—"*On the forces behind "nature.*"

In Vol. 6 of "Winslow's Journal of Psychological Medicine," for April 1st, 1880, is seen an article by Dr. WINN, of London, with this very unseemly and inappropriate heading, viz.—"*The collapse* "*of Scientific Atheism.*"

The "*Lancet*," dated June 25th, 1881, has in it the Harveian Oration by Dr. BARCLAY. A perusal of these several productions are to my mind, altogether unsatisfactory; inasmuch as they deal not with facts. They appear to have been composed when their several authors were under the dominion of the mere feelings, *i.e.*, the emotions of our complicate nature: than which nothing can be more misleading. It was asserted by DESCARTES that—"if it "be possible to perfect mankind, the means of doing so will be "found in the Medical Sciences"—but in what way or how can perfection of any kind be associated with the very strange teachings of the authors named above? "Teachings" which so plainly degrade the natural laws, and mystify the material sources of man's well being. Moreover, the acceptance of such "teachings" by the medical profession in the mass would, of necessity, result in simply this—the doctors must then stand aside, and so find room for better and outside scientists, who would ere long, come to the rescue of truth, and place themselves on a pedestal of their own exclusive creation.

But to these especial essays of Drs. CARPENTER, WINN, and BARCLAY, we desire merely to direct the attention of the reader of this essay "On Life and its Lessons"; to fully criticise them the space at our disposal does not permit. A few words, however, in explanation are here offered; and these it is hoped will suffice to give a oneness of character—an uniformity of purpose—to this essay.

Of the "forces behind nature" it is impossible for the practical scientist to conceive. To degrade matter or the natural laws—to put on one side, as of secondary importance, the hard materials of which we are made—in the vain attempt to find room in the organism of man for an ideal "force," for which no kind of necessity can exist, is simply to ignore the straight and ordinary pathways to knowledge, and to imitate our forefathers in their wild imageries and sad impositions. This, the present time (1883) will not tolerate; though Dr. CARPENTER may think otherwise; but, as the late J. S. MILL declared, the paper itself is merely metaphysical and in no way logical: and with this verdict we dismiss the "*forces* "*behind nature*." to the oblivion such demand.

In the strange paper from the pen of Dr. WINN, of London, there is much to surprise us in the shape of dogmatism and abuse. The doctrine of materialism is according to this author, "tottering "to its fall," and "is played out." The abuse heaped on Professor TYNDALL is couched in no ordinary terms. According to Dr. WINN'S reading of "progress" or rather "no progress"—*the good old times*, as he will so have them—must remain without change. "*All unverified theories*," though proclaimed by a TYNDALL must tend "to subvert the fundamental principles on which our morality and "polity are based." Where then—it should be asked—is his own "theory" of spiritism? Where, indeed? Well may SHELLEY exclaim—

"There is delusion in the world,"

and hence only the "woe and fear," which the too fervid, yet morbid imagination of Dr. WINN conjures up.

If TYNDALL does see in matter "the promise and potency of "all terrestrial life," why in so seeing can it be inferred, or on what grounds concluded that he (TYNDALL) is, as Dr. WINN affirms, "*the subject of unbelief in what is true*," or is purged "*of a due* "*faith in whatever is good and profitable to humanity*"? However, the dreary region built up and incorporated by this writer in "materialism" is simply the outcome of credulity—of a blind and wretched faith: and such poor stuff it is which has arrested, to no slight extent, the spread of science—of physiological science—and stultified not a little, the hard labours of many a good and great man.

To proceed—Dr. BARCLAY, whilst eulogizing the logical faculty, affirms—but too truly—that "medical science is ever bending the "knee to the idols of fashion and prejudice, forgetful of her higher "mission, to *seek and follow only truth*." He then—strange to say—goes on to censure J. S. MILL for teaching that all the laws of nature are unfailing; and, furthermore, for stating that this fact must form the major-premiss "in every argument regarding such "obscure subjects as the origin of life, of generation, of development, and of decay and death." Not content so far, he—Dr. BARCLAY—proceeds to offer objections to MILL'S very clear statement of the case as above stated, and ends by a defence of the immaterial—the metaphysical—as the only true and sufficient cause of the aforesaid, "unfailing laws of nature." So it is, this professed lover of logic, so much in love with the truth, and disgusted with the "*idols of fashion and prejudice*," ignores the inevitable "*major-premiss*," and oversteps the real and tangible, for a wild and haphazard pursuit of the unreal and intangible, *i.e.*, the unknowable. One thing Dr. BARCLAY does prove; it is this, viz.: we live still in this year of grace 1883, "*in the cold winter of the world*," so named by the poet.

Enough and more than enough of evidence is already shown to demonstrate the very sound advice of POPE conveyed in these few words, viz.: "Presume *not* the invisible (unknowable) to scan," but rather know well "that each atom of matter did ever possess the same "properties which it exhibits now; and that these atoms associated "themselves in certain groups--in consequence of their especial "acquirements; and that out of these groups certain definite results "of combination occurred—which were, like matter itself, eternal; "and for this reason entitled to be called the 'laws of nature.'"

The fact is beyond dispute, that of matter—

> "No atom of this turbulence fulfils
> "A vague and unnecessitated task,
> "Or acts but as it must and ought to act."

One more contraversionalist, a non-medical writer, remains to be dealt with—The Lord Justice FRY. In a late number of the "*Contemporary Review* is a paper by this gentleman, entitled. "*On Materialism.*" In it he denounces and degrades matter, or the doctrine of materialism, whilst he writes in much favour of its opposite, viz.: "immaterialism," *i.e.*, a something not material, or without parts or dimensions, with nothing physical about it; but as he affirms—"with powers to work more than wonders, and with a force of its "own exceeding each one and every form of matter." This very dogmatic assertion he props up or sustains by the annexed few words, viz.: "Science may shift the incidence of the difficulty as it "likes; you cannot escape from it—you cannot escape from the "admission of a something not matter." What a strange conceit is this! A "*something*" *not* "*matter?*" Such must be an error somehow—were such words in the MS. of the author? A rare "conceit" indeed—one which SHAKESPERE would have included with the many more he declared "*poisonous.*" A "conceit," moreover, of which old SEDLEY wrote—

> "As the dropsy of the soul,
> "Whose thirst we must not yield to, but control."

The treatment of "materialism" by Lord Justice FRY is a practical demonstration of the truth conveyed in the annexed quotation from the eloquent lecture of Dr. HENRY MAUDSLEY, entitled "*The physical basis of will,*" viz.: "What science repudiates and "condemns, I believe, is the presumptuous pretence on the part of "theology to know and tell all about the inscrutable; to put forward "as truths, not even to be questioned, childish explanations which "are an insult to the understanding, and would be its suicide if "really accepted; to demand reverent assent to doctrines which "sometimes outrage moral feeling, and to declare solemnly that "whosoever believeth not the fables which it proclaims, 'shall "without doubt perish everlastingly.' " [*]

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[*] It is, I conceive, not easy to withhold our approval of the outspokenness of Dr. MAUDSLEY; he has no doubt the courage of his convictions. If there were less cant, less hypocrisy in the world, we should know much more of the like "courage." However, it is plain that those of the medical profession, *i.e.*, the few who can and will do their own thinking—those who prefer facts to fiction, or reason rather than tradition, are pursuing the right course and so realizing more and more of the truth. This fact acquires confirmation, of no common kind, if we look to the expressed convictions of such men as—The Rev. STOPFORD BROOKE, The Rev. J. COPNER (author of "*The Veil Removed*"), Messrs. M. CONWAY and VOYSEY, not forgetting the late Bishop COLENSO. How very like are the "expressed convictions" of those just named to the teachings of the late Sir WM. LAWRENCE—as found in his "*Lectures on Man,*" delivered at the College of Surgeons, in London, in the early part of the present century; "teachings" echoed since then by many good and accomplished physicians and surgeons up and down this country and elsewhere. These facts speak volumes, and assure us that the best men in both the clerical and medical profession, will, ere very long, reach a oneness of thought, a singleness of purpose, calculated in every way to hasten the advent of a civilization the reverse of spurious—as is this present one, and competent withal to aid in the diffusion and acceptance of a practical morality by mankind: then, and not till then, shall we be found to either *forgive our enemies* or *love our neighbours.*

So far "the few" the "best men" among the clergy and doctors; but of the masses in both callings.—These must ever command the pity of those more highly gifted with brain power. With such pity must ever be combined the hope to forget the long continued persecutions of such sadly mistaken men as LAUD and CALVIN; who, backed by a State Church, caused the ruin and death of not a few—their superiors in intellect and piety—and among these of the ever-famous physiologist SERVITUS—burnt to death by the command of the latter-named priest. But the fates, if there be such, have ever dealt cruelly and harshly with those within the medical calling—students or practitioners, in advance of their times—thus the famous anatomist, VERSALIUS, was in the 16th century driven into exile by the inquisition; and in exile died. It has been said in want of the common necessaries of life. Dr. LOPEZ was hanged by order of the Queen ELIZABETH, being charged with an attempt to poison her. Dr. JOHN FRIEND was sent to the Tower, for treason, in 1745; and LAVOISIER was guillotined, in 1794. In addition thereto, So far the "immaterialists;" those peculiar philosophers whose prime effort seems to be "to give to airy nothing a local habitation "and a name" withal.

The attention of the reader is now asked to a class of facts of the first importance; inasmuch as they rest on a basis sure and demonstrable, *i.e.*, the organism of man as of all living things.

Now, in the conversation of most persons the words—"life," "mind," "will," etc., are in common use. Such words are employed as if they represented so many entities, or existences; and not so many functional activities—the mere outcome of the heart, lungs, stomach, brain, etc. The "life" of man, like his "mind" is the sign in him of a force given off by the nervous system—the organic nervous system. In the assemblage of the bodily functions we recognize life; in the assemblage of the cerebral functions, *i.e.*, in cerebration we recognize mind. Now, apart from matter there can be neither life nor mind. The many forms of animate nature—from man to the zoophyte—owe their being, their life to the millions of minute cells entering into their composition. The anatomist recognizes many varieties of cells; there are brain cells, lung cells, heart cells, liver cells, etc., in each kind of cell being the root or starting point of an especial force of its own—thus it comes to pass that the brain, the lungs, the heart, the liver, etc.,

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Leighton, Copernicus (M.D.), and Galileo in the middle ages, also Lawrence (before named), Jenner, Combe, Inman, Elliotson, Engledue, Darwin, and Huxley, etc., in the recent or present times were either tortured, or imprisoned, or fined, or subjected to no end of falsehood and personal abuse. However, a very decided change for the better is now coming about; and this is assured to us in the sermon read before the British Medical Association, by the Bishop of Liverpool, this present year. With not a little that is specious one may read therein more that savours of science, more of the really tangible or material, as opposed to the spiritual.

Without doubt the strife, the jealousies and wrong-doing—in a word, the *chaos* which characterised the past and which is now so certainly on the decline, must ere very long be eclipsed or succeeded by the ever constant supremacy of the higher—the nobler feelings in mankind—when the intellect (reason) then no longer restrained or held in bondage by ignorance, prejudice, or superstition, will be seen in the attempt to reach the supreme, the ascendant here and elsewhere. With further experience this great and important fact must be recognized, viz., *constraint in no form, and* under *no circumstances* can *be held competent* to *realize or insure an uniformity* of *creed* or a *oneness of faith*, or a *sameness of worship among men*.

To many men, many thoughts; yet it may be well said that, in the words of the old Greek Poet and Philosopher, Xenophanes—

"No man has yet seen the truth, and man shall never
"Know what is truth, in regard to matters infinite.
"For should one chance to say what's near to truth,
"Still he knows naught, and doubt is over all."

And after a period of between two and three thousand years, we find a modern poet (Longfellow), asking this question of the many sects of religionists, viz.: which one of you "dares"—

"*To say that you alone has found the truth.*"

are enabled to perform their allotted functions in the animal economy—in other words to think (cerebrate), to decarbonize the blood, to circulate the blood, to secrete bile, etc., and so on to the end. The remarks to follow will, it is hoped, prove or demonstrate the above assertions.

There is a famous axiom—very generally accepted by physiologists—and this may, with much propriety, preface this essay "On Life and its Lessons." "Without a nervous system there "is no animal, there can be none; without a circulating one "there are myriads." Now it is in no small degree favorable to the materialistic view of life—regarding it as an assemblage of functions in man—that what is first seen in the fœtus are certain rude and immature traces of nervous matter on either side of the spine; and that such nervous matter constitutes in due course a bundle of cells: and that this bundle of cells realises in its further progress the basis, or central point, of the great sympathetic nerve: and, hence, the origin, or creation, of that wonderful force on which the several vital phenomena are dependent in both man and the lower order of animals. To the "*Solar Plexus*," so called, and its accessory ganglia, must be referred—and on grounds to be shewn herein—the power necessary to enable the organism, both in its incomplete and in its complete condition, to perform its offices in the animal economy. The farther growth and multiplication of cells, or their coalescence (ganglia), assumes a corresponding growth and development of parts of the organism indispensable to the full maturity of man and animals. Now if such cell formation is interrupted, then there is seen a corresponding interruption in the progress of the organism, or of parts of it, towards perfection; and so it is that monstrosities are not infrequently witnessed in man and beast. BLUMENBACH regarded monstrosities as due to a failure of what he called the "*nisus formativus*," or the formative power. In theory he was right—but BLUMENBACH knew not in what or whence this power, or force, originated. The great sympathetic nerve—the ganglionic nervous system—was a terra incognita to him and his compeers; and so were the effects of partial arrests, or obstructions, in the cell structure (ganglia) engaged in the elaboration of the fœtus in utero. Whilst in former times it was taught that the brain was the root, or starting point, of the nervous system—that, in fact, the brain took precedence of every form of nerve-tissue in man, and the higher orders of vertebrates —it is now conceded that the formation of the brain occurs subsequently to the spinal cord and the nerves issuing from it, and after the ganglia of the sympathetic nervous system. In fact, this last named structure it is which precedes every other in the whole organism of man and animals. Seen in its origin—as a single cell—the multiplication and development thereof realise in due course so many ganglia—each one of which is endowed with an especial function, or force of its own—and these (ganglia), with the solar plexus as their great centre, may be well said to hold a precisely similar relation to the otherwise inert and insensible frame—to the otherwise dull and unmoving organism, as the "vital fire" did to the animated statue of PROMETHEUS. The preceding facts being accepted, the monstrosities here recorded are duly explained, and their creation well understood.

The late Dr. M. HALL records the birth of a child in which there was found neither a brain, nor a spinal cord; but the absence of these two important organs did not, in the least, affect or influence the creation, growth, and maturity of the child. Dr. M. HALL wrote thus, "the child, such as it was, was perfectly "developed; in other words—the circulation, nutrition, and "secretion were duly performed, *without a cerebro-spinal system.*"

The late Sir WILLIAM LAWRENCE recorded the case of a child born with no vestige of a brain—an acephalous monstrosity. In reference to it we are told that "not only were the excito-motory "functions performed, and that the child gave evidence of pain, "and at first moved briskly—and that the sphincters performed "their offices; but, what is a very material point, the child's "breathing and temperature were natural. Moreover, it discharged "urine and fœces."

These two cases of monstrosity afford in themselves the most conclusive evidence in favor of the independence of the organic, or ganglionic nervous structure; they prove, beyond all doubt, not only the capability of the same nervous structure to sustain the intra-uterine life of the brainless and marrowless fœtus, but its power, alone and unaided, to develope and mature the organism itself—in its entirety. Who in looking to the "amyencephalous"—to the brainless and marrowless monster described by HALL, could affirm that either the brain or the spinal cord was indispensable to existence, *i.e.* life. Or who, in looking to the "acephalous"—the brainless monster reported by LAWRENCE, would venture to declare that the influence of a brain was necessary to the same, viz., LIFE, or that it (the brain) was anything more than one of the several instruments of life in man and beast. In both these instances we have the requisite data (facts) to demonstrate to us as plainly as can be demonstrated—the perfect and normal operation of the ganglionic nervous system. We see the body nourished, the viscera perfected, and the bony fabric matured; and we must be assured, therefore, that circulation, absorption, etc., have been in full operation—in perfect action—with no brain, nor spinal cord —*and with only a ganglionic nervous system.*

Exceptions, it is true, have been taken to the above, but with no kind of reason. There are, or were, anatomists who, in pursuing their investigations into the nervous structures of the fœtus and of the lower animals, have mistaken the ganglionic nervous organism for the cerebro-spinal system; and, hence, have arisen many errors and fallacies—and such, it becomes us to ignore in the interest of truth. To the late Dr. FLETCHER we are indebted for much information in respect to this matter. He has written thus, "It is "true not a few accounts are on record, of monsters born at the "full time, without any appearance whatever of a nervous system "of any kind; but if we attend carefully to such accounts we shall "perceive that their authors have been, in general, employed in "looking for a spinal cord and brain, and the larger nerves "connected with them; and might easily have overlooked those "smaller filaments which belong to *the ganglionic system*; and "this seems the more probable when we call to mind how long it "was before this system of nerves, even in the most perfect "examples of the highest classes of animals, was detected; and "how recently the presence of nerves in the heart, upon which some "of the most conspicuous filaments of this system of nerves are "distributed, was resolutely denied. It is not, indeed, improbable "that when the monstrosity is excessive, the unformed mass may "have its nervous system, as well as all its other organs—as is the "case in quite the lowest tribes of animals—so generally diffused "as to be invisible."

"It is stated on good authority, and as the result of numerous "and patient enquiries on the subject, that so long as a human "monster does not very considerably depart from the human form, "the ganglionic system of nerves is in general, if not always, "*quite perfect.*"

It is certain that in all forms of monstrosity, and in the dissection of cases of congenital idiotcy—whatever the organic defects may be, whatever the amount of atrophy or disease presented by the cerebro-spinal system—that, in the words of Dr. CAYRE, "*the ganglions of the sympathetic nerve are in general, perfectly healthy;*" and regard being had to the dependence of the first-named on the second, such is exactly that to be anticipated. No one needs be told that the base exists before the superstructure; and, what is more, that such base may have a permanent existence without the same superstructure. This latter, too, may, or may not, take on such a form of development as to enable it to manifest qualities and conveniences of its own; but these can never exist else than in a state of dependency or reliance on the pre-existing "base."

The above position may be well demonstrated by what is known as the effects of a smart blow on the epigastric region, below which rests the great solar ganglion, or cœliac-axis—the root or basis of the ganglionic nervous system. To arrest the brain power of your antagonist, and to paralyse his sentient and motor powers; or, which is the same thing, to throw him into a deep and, it may be, a fatal collapse, it is necessary only to give him a heavy blow on the pit of the stomach. Not infrequently you will see it recorded that a pugilist kills his adversary outright by such a blow on the locality indicated. If there is a part of the body which can be called the *seat of life* in man and animals it is in the near vicinity of this "pit of the stomach."* The position here taken has been dwelt on and enforced by the late Sir CHAS. BELL, in the following words, viz. :—"A blow on the pit of the stomach "doubles up the bruiser, and occasions the grasping and crowing "which sufficiently indicate the course of the injury. A little more "severe and the blow is instantly fatal. A man broken on the "wheel suffers dreadful blows, and his bones are broken, but life "endures. The *coup de grace* is a blow on the stomach."

The annexed case is close to the point: I have taken it from the *Times* newspaper, though of a date long past. "Richard "Laws, aged 32, was indicted for feloniously killing John Smith, at "Norwich. It appeared that the prisoner and others were spending "the evening at the Cock Inn, at Nethwold, near Norwich.

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* The views advocated throughout this address derive much support from the experiments of BROWN SEQUARD—instituted with the view to demonstrate the source of the "*nutrition of the brain.*" At page 23 of Drs. GUTENBURG and GUTTMAN's Physiology and Pathology of the sympathetic nervous system,—translated by A. NAPIER, M.D., of Glasgow—are these words, viz., "BROWN SEQUARD states that within a few months after "division of the cervical sympathetic in guinea-pigs and rabbits, he observed atrophy of "the corresponding half of the brain. After him, VULPIAN obtained the same results." Strong evidence this of not only the priority of the cervical ganglia of the sympathetic (and hence, and as a matter of necessity, of their root—the "solar plexus") to the brain, but of their direct and normal influence over it.

Now this priority of the ganglionic nervous system, *or* of its several ganglia, as seen, for instance, in the human embryo, I have heard disputed. However, the fact is asserted on the best authority. ACKERMAN, LAWRENCE tells us, commenced and pursued his enquiries into the development of the nervous organism in the human embryo; and with no preconceived views or opinions on this interesting subject, he concluded, nay more, insisted on it, that the organic or ganglionic nervous system is that particular portion of our organism which is first formed *in utero;* and may, therefore, be rightly considered as the *germ* of all the phenomena to be afterwards developed. MULLER, too, writes in his "Physiology," translated by Dr. BALY, that the sympathetic nerve is the part first formed in the fœtus. ROLANDO, also, has declared that "what has been usually considered as "the first traces of the vertebræ, at the sides of the spinal cord, in birds, to be the ganglia "of the sympathetic nerve." BLUMENBACH and GALL taught that "the nervous system," meaning the organic nervous system, "of the chest and abdomen are fully formed, while "the brain still appears a pulpy mass; and that these ganglia and nerves would hardly be "formed before the brain and spinal marrow, but for the sake of the organs which they "supply; and the functions of which are as perfect at birth as at adult age, while the mind "and brain are slowly perfected." Nothing, indeed, can appear more reasonable than that the portion of our organism, from which every other takes its character and vitality, should enjoy a prior existence. The foundation is constructed before the house—the base before its superstructure.

Reference may be very appropriately made here to the notable experiments of the late Sir B. BRODIE on frogs, guinea-pigs, cats, and dogs. In these animals either the spinal cord was destroyed, or portions of the crural and sciatic nerves removed, and with the inevitable consequence to each frog, guinea-pig, cat, and dog, of the loss of all power in those parts below the said vivisections, in so far as the cerebro-spinal functions were concerned. But on wounds and fractures being made in the extremities so deprived of nervous influence (*i.e.* cerebro-spinal influence), the same were found to heal and unite—"not less readily and completely than under all ordinary circumstances."

A moment's reflection on the vivisections referred to is alone sufficient to assure us that the healing of the wounds, and the reparation of the fractures, were severally due to the integrity of the ganglionic nervous tissue. This was, in each of the instances cited, left intact; and there could be no reason, therefore, why the incisions should not heal—or why even the broken bones in the frog, guinea-pig, cat, and dog, should not unite.

"Among the company was the deceased, a Herculean corporal "of the Guards; who, after the fatigues of the day spent in "recruiting for the Russian war, had repaired, with a promising "recruit, to that place of entertainment. In the course of the "evening the recruit grew valorous, and to show how fit he was to "thrash the enemies of his country, he challenged the prisoner; "who, nothing loth, accepted the offer, and a fight was knocked up "for 5s. a side. The corporal of course backed the recruit, but, "much to his disgust, the prisoner soon had by far the best of it, "and would in another minute have won the stakes, when the "corporal interposed and said that if the recruit was no match "for the prisoner, there was a little chap (meaning himself) 'who "was ready to lick him.' The prisoner thereupon agreed to transfer "his attentions to the corporal, and they forthwith proceeded to "fight. After a round or two the corporal planted a heavy blow on "the forehead of the prisoner, who returned it with interest on his "opponent's belly. No sooner had this blow been struck than the "gallant fellow fell back on the floor a lifeless corpse, to the "amazement of all present. A surgeon was immediately called in, "but could detect no mark of external injury to account for death. "The body was that of a fine healthy man, and, strange to say, the "*post mortem* examination disclosed no marks of internal injury. "The surgeon said that death, under the circumstances, could only "be attributed to a sudden shock to the nervous system, which "might follow immediately on the infliction of a blow on the "stomach, at the back of which was *the great nerve*. The Chief "Baron left it to the jury to say whether they thought the death of "the deceased was occasioned by the blow of the prisoner given in "the fight; if so, they ought to find him guilty; but if they could "not say what was the cause of the death, or if they should think "that the death was attributable to excitement and was "independent of the blow, the prisoner would be entitled to an "acquittal." It is added, "The jury deliberated a few moments, "and returned a verdict of not guilty."

Many years after the foregoing views as to the great sympathetic nerve—its origin and uses in the animal economy—were published, Professor HUXLEY wrote his famous article, "The

Physical Basis of Life,'' which appears in the *Contemporary Review.* At a recent meeting of the British Association HUXLEY reverted very happily to this subject. It is said that he shewed how men had generally abandoned the idea that the body was like a machine, the different parts of which were essentially separate, and might, therefore, be treated independently; and had learned that it might rather be likened to an army, each cell a soldier, each organ a brigade, the *central (or ganglionic) nervous system* head quarters and field telegraph, the alimentary and the circulatory system the commissariat; losses being made good by recruits born in camp, and the life of the individual being a campaign, conducted successfully for a number of years, but with certain defeat in the long run.

Not a bad analogy this; at any rate it is picturesque and attractive. It has, indeed, the true ring of materialism, and as such, is worthy of the sympathy and attention of thinking men. To our good yet mistaken friends the metaphysicians it may be well and kindly recommended; for however wide our opinions and theirs, yet should diverse judgments stand in no way of friendship or a kind sympathy; knowing, as all so well know, that—*as the poet has declared*—

> "'Tis Heaven each passion sends,
> "And different men incline to different ends,
> "Extremes in nature equal good produce,
> "Extremes in man concur to general use."

If we carry our investigations onwards, say from physiology to pathology, *i.e.*, from health to disease, the same general principles are found in operation; no new forces, no new laws appear in connection with the material structures occupied or engaged in the various diseased states of our organism. Hence, the truthfulness of the famous remark of Sir T. BROWNE, viz., "'Tis as natural to die, as to be born." Each and every man and woman exists in certain relations with the external world, and the harmony which results from the maintenance of these relations is termed health; whilst a disturbance of the same relations, whether from a subjective or objective cause, or from both, is discord or disease. Dr. MAUDESLEY writes thus, "There is nothing special in disease, each "cell has its appointed period of life; and each species of cell its "natural degree of life; and as there are many cells, and many kinds "of cells in the human body, it is evident that disease will be more "easily initiated in it than in an organism with less differentiation "of tissue, and less complexity of structure. For the life of the "organism is the sum of the life of its individual parts, and "superiority of vitality signifies more numerous, special, and complex "relations with the external. In the lowest organisms where there is "a similarity of structure, one part is independent of another; and "dependent not only on the maintenance of certain general and "simple relations with the external; there is, therefore, comparatively "little liability to disturbance. When the parts are, however, unlike, "and there is a definite subordination of them, so that the well being "of the highest structure is dependent on the well being of all the "structures which intervene in the descending scale between it and "inorganic nature, there is plainly abundant room for disturbance. "As in the state, so in the organism, the vitality of the government "flows from, and rests upon the well being of individuals."

That the foregoing views in relation to diseased action in this organism of ours were a quarter-of-a-century since disputed is certain; for in the *British and Foreign Medical Review* is an article from the pen of Sir J. PAGET, in which he withholds his belief in what is called the "neuropathic" theory of disease. However, it is easy, indeed, to prove that this same theory is founded on facts, and is true. Sir J. PAGET affirms that inflammation occurs in the several tissues or organs of the body, quite irrespectively or independently of the cell structure, or nervous tissue; and that "the firmest "tendons and articular cartilages are liable to inflammation." These, it is added, "have no nerves, and, therefore, must such "inflammation, when it occurs to them, be independent of any-"thing like a nervous origin." Without doubt "the finest tendons "and articular cartilages" *are* without traces of cerebro-spinal nerves; but, it is asked, do not these structures contain organic or ganglionic nerve tissue. That such is the case is undeniable. But other eminent surgeons, *e.g.*, SIMON and WHARTON-JONES, have expressed themselves as Sir J. PAGET has. Mr. SIMON refers not to what he supposes nerveless structures, viz., tendon and cartilage, but to paralysed parts and those rendered nerveless by operation or division of nervous trunks, *i.e.*, cerebro-spinal trunks. He gives a case of anæsthesia of the fifth nerve dependant on organic disease, wherein the local contact to the conjunctiva of a few grains of cayenne pepper caused violent inflammatory symptoms. It is added, no nervous excitement could have preceded this said inflammation, because the fifth nerve was annihilated. The patient operated on suffered neither from pain, nor from lachrymation. Further, Mr. WHARTON-JONES in his lectures adopts a very similar line of argument to Mr. SIMON; he, however, would seem to agree with Dr. BILLING so far as to suppose that the capillary congestion, or "dilitation" *(Henle)*, or the stagnation of the blood is directly the effect of a suspension of the nervous influence on the arteries, and not on nervous excitement—referable to the ganglionic nerve tissuė.

VIRCHOW is, beyond doubt, right in referring all kinds of morbid action to "physiological types"; and in maintaining that there is no new structure produced in the organism by disease; that, in short, the "cancer cell," the "pus cell," and "all *other disease producing cells, have their patterns in the cells of healthy structures*."

The remarks thus far cover what is properly called the vegetative life of man and animals. But this vegetative life is supplemented in the immense majority of organized beings by the animal life. In fact the latter named constitutes an additional series of phenomena superposed, "on the fundamental vegetative or organic life." And if in this progressional ascent of being, we find what was at first the mere addition, becomes at last the most important, so that the vegetative life in man seems destined only to create and sustain the animal life; his moral and intellectual attributes becoming the highest functions of his existence; this remarkable fact does not affect the order of biological study, but points to another fundamental science—SCIOLOGY, which takes its rise from Biology.

One very significant entity assumed by the immaterialists, or metaphysicians is thus disposed of, viz.: "LIFE." Another is expressed by the word "MIND;" but to believe in such as an entity —or as having an existence *per se*—is not more easy or more demonstrable than is "life" itself. The word "mind" facilitates conversation; it implies only a quality or power of matter—of cerebral matter. The function of the brain, or cerebration—the thinking and feeling of man and animals is expressed by the word mind. So far, good. Now, the work of Dr. BASTIAN, which is of recent date, has this very unscientific title, viz.: "*The brain as an organ* "*of the mind.*" The reader is asked to fancy a book with this title, viz.: "*The eye as an organ of the sight*"*;* or "*The lung as an organ of the breath*"—"*The liver as an organ of the bile*"—or "*The stomach as an organ of the digestion;*" and so on. Furthermore, an authority in matters theological has gone out of his way to diffuse views of the brain and its functions scarcely less inimical to the truth and to a sound physiology, than has Dr. BASTIAN. He, the BISHOP OF GLOUCESTER, has very naively declared that we may never hope to bridge over the space which separates thought from the material brain. Does the Bishop fail to perceive a something like a difficulty in comprehending the how and the why it is the lungs have the power to execute their peculiar function in the animal economy. Does he so easily grasp the facts embraced by the hepatic function as to perceive the *how* and the *why* it is the liver realizes its exclusive powers in man and beast. Can he bridge over the chasm—as he would say—which separates digestion from its organ, the stomach?

What are cerebration, breathing, the secretion of bile, digestion, and so on, but simply the effects of so many organic conditions essential to the entirety of animal life. If Dr. BASTIAN and the BISHOP OF GLOUCESTER cannot see the dilemma in which their too narrow views place them, others, it is hoped, enjoy a better vision.

Both, the materialist and the immaterialist, must admit—the first named as readily as the second—how very far beyond their ken is the full understanding of the several functions here glanced at. They, together, can but wonder at such manifestations of power; and regard with much admiration and profound reverence the very perfect and beautiful scheme of vitality, as demonstrated throughout the whole organism of man and living things. If the immaterialist (the metaphysician) will have some intangible substance (so to put it) to aid these several organs, viz.—the brain, the lungs, the liver, and the stomach, and so on, in the performance of their several functions, why does he not claim a like "*substance*" (if he can so regard it) for phenomena equally mysterious and incomprehensible, *e.g.*—for the fall of a stone to the earth, for the comet traversing the heavens, for the thread attracted by amber or sealing-wax, for the revolutions of the planets in their orbits; and not the less for the creation of a NEWTON or a FRANKLIN. The mystery of "mind," so called, is on a par with that of life—such cannot be solved. As COMTE has said, "no positive philosopher attempts to "penetrate the mystery of either life or mind; he objects, however, "and very wisely objects to the metaphysician calling it a spirit, *as* "*if he could know.*" COMTE objects, furthermore, to the metaphysician troubling the already difficult course of investigation into the organic laws by assumptions and dogmas relative to that spirit, *as if he* (the metaphysician) *knew anything about the matter.*

The late Sir WM. LAWRENCE has these words—to be seen in his "Lectures on Man" (p. 96 and seq.) "Who knows the capa- "bilities of matter so perfectly as to be able to say that it can see, "hear, smell, taste, and feel, but cannot possibly reflect, imagine, "judge? Who has appreciated them so exactly as to be able to "decide that it can execute the mental functions of an elephant, "a dog, or an orang-outang, but cannot perform those of a negro, "or a Hottentot." If the intellectual phenomena of man require a spirit, an immaterial principle superadded to the brain, we must equally concede it to those more rational animals which exhibit manifestations differing from some of the human only in degree. If we grant it to these, we cannot refuse it to the next in order; and so on in succession to the whole series—to the oyster, the sea-anemone, the polype, the microscopic animalcules. Is any one prepared to admit the existence of immaterial principles in all these cases? If not, they must equally reject it in man. If the mental processes be not the function of the brain, what is its office? In animals which possess only a small part of the human cerebral structure, sensation exists, and, in many cases, is more acute than in man. What employment shall we find for all that man possesses over and above this portion—for the large and prodigiously developed human hemispheres? Are we to believe that these serve only to round the figure of the organ, or to fill the cranium? It is necessary that clear and decided views should be arrived at on this subject, as it has a close and immediate reference to an important branch of pathology. They who consider the mental operations as acts of "spiritism" or of an immaterial being—and thus disconnect the sound state of the mind from organization, act very consistently in disjoining insanity also from the corporeal structure, and in representing it as a disease not of the brain—but of the mind, *i.e.* spirit. Thus we come to disease of an immaterial being, for which, suitably enough, moral treatment is recommended. I firmly believe, on the contrary, that the various forms of insanity, that all the affections comprehended under the general term of mental derangement are only evidences of cerebral affection; disordered manifestations of those organs whose healthy action produces the phenomena called mental—in short, symptoms of diseased brain.

Such symptoms, it may be added, have the same relation to the brain, as vomiting, indigestion, and heartburn have to the stomach; as asthma and cough have to the lungs—or any other deranged functions have to their several and corresponding organs. It is now close on forty years since that the late Dr. ENGLEDUE put the same views as those quoted above from LAWRENCE'S "*Lectures on Man*," before what was then the "LONDON PHRENOLOGICAL ASSOCIATION;" and although some thirty years had then passed since LAWRENCE'S lectures were addressed to the members of the Royal College of Surgeons, of London—ENGLEDUE met with similar ill-treatment to that heaped on LAWRENCE. Such is ever the fate of truth-seekers—their doom is misrepresentation, if not persecution. ENGLEDUE'S address contains these words, viz:—"What is organized matter? Merely a "collection of atoms possessing certain properties, and assuming "different and determinate forms. What is brain? One of the mani"festations of animal life—resulting from a peculiar combination of "matter. The varied changes of form which this matter assumes, "give rise to the numerous manifestations of cerebration in the "different tribes of beings; and the various changes of cerebration in "the same being originate in molecular attractions, merely other "expressions of a new condition. Cerebration, then, expresses the "manifestation of a series of actions resulting from the properties "possessed by a particular portion of organism—brain—when acted "upon by appropriate stimuli; in the same way as the organism "generally has the power of manifesting when the necessary stimuli "are applied, the phenomena which we designate by the term life. "So one individual portion—brain—having peculiar and distinct properties, manifests, on the application of its appropriate stimuli, a "peculiar and distinct species of action, which we propose to call "Cerebration. If the sum of all the bodily functions—life—be not "an entity, how can the product of the action of one portion of the "body—brain—be an entity?—feeling and intelligence are but "fractional parts of life."

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We see then no better reason for supposing that the manifestation of cerebration depends on the excitation of cerebral matter by a spirit force, an essence—the mind—than we do that the bile, or the saliva are secreted by their respective glands through the instrumentality of the same, or some other essence. We do not speak of liver principle or salivary principle—we see a certain arrangement of particles in the form of an organ called liver, and a certain kind of blood sent out to it; the result is the secretion of a particular fluid, which we call bile; further than this we cannot go. No other organ is so organized, no other organ produces a similar secretion. The conclusion, then, is inevitable—the doctrine of materialism is true—that of immaterialism—false.

The question which presents itself is thus brought within very narrow limits. What is to be done with this material—this compounded organism of man. In what manner can we utilize it—make the best of it? Can we so influence it for good as to realize the progress of our kind; increase the well being and happiness of man—or, in other words, further the great and noble cause of civilization? To these several queries but one reply is practicable—that reply must be in the affirmative—YES.

Now it may be taken for granted that each average man or woman will admit that for the tone and quality of his or her organism—the nervous organism—he or she is greatly indebted to progenitors.

It is assumed that from the character of his or her surroundings at birth, and subsequently thereto, *i.e.*, during the early years of childhood and youth—each person, of either sex, stands indebted to those having the care, day by day, of him or her. Furthermore, and as time moves on, it will be granted that whatever may be said of the physique—the mental tendencies, now in good part developed—can hardly be considered apart from the several antecedents above referred to. It is then conceded that each individual must ever be regarded as simply a reflex, in very great part, of the law of heredity; as well as a shadow—more or less distinct, of his training—its kind and tendencies—regarded from both an intellectual and moral point of view. Like clay in the hands of the potter, each man and woman bears, to a large extent, the impress of a power which is essentially objective or outside himself or herself. What there is of the subjective is moulded by the objective; and hence it comes to pass that—as the late ROBERT OWEN affirmed—"*The character of man is formed for him and not by him.*" In this case and under the circumstances here named, we will suppose the birth of a child of high class parents—a man and woman of culture—who have largely profited by good precepts and wise examples, and who have lived under the influence of the higher feelings and instincts of our complicate nature. Now, what else could be predicted of such a child than that he or she—the inheritor of a sound and healthy nervous organism—the recipient also of a first-rate education or training, day by day—with, in short, the mens sana in corpore sano—would, on reaching adult life and on entering the marriage state, realize in the children born to him or her, many of the virtues and much of the intellect with which nature had endowed himself or herself. Furthermore, suppose the same individual (a man) acting under the guidance of an acute moral sense, and of a highly trained reasoning capacity, wedded to a woman endowed like himself with a high class material structure (organism) and gifted also with a well-formed brain, dominating alike each act of her life and its many belongings—what may not be looked for in the offspring of such a pair of beings? In the case imagined the children would, with much certainty, start afresh from the vantage ground of their progenitors, and so realize what the older physiologists called "a bound onwards" of the "*nisus formativus*" [*]—*i.e.* the formative principle in man. The

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[*] This "formative principle" Muller recognizes as the force by which the organism of man and beast is built up. This force, he affirms, does, now and then, and under favorable circumstances, take "*a bound onwards and upwards;*" and, as a consequence only of a certain and favorable change in (as I would say) the organic or sympathetic nervous system; the resultant of past objective conditions in the life of the individual. To this fact may be attributed the progression of mankind—its advance "onwards and upwards." On the other hand, Muller teaches that this same "formative principle," or "force," is, now and then, so far "*interfered with,*" so much "*disturbed,*" as to give rise to the creation of some one kind or other of monstrosity.

If progress then be the law of life, and such rests on the conditions here named, we have good reason to feel sanguine in so far as the future of mankind goes. The biographies of not a few men may be said to be demonstrative of the capability of this "*nisus formativus,*" so called by Muller, to "*bound onward.*" In the instances of the negro Capetain, Rammohun Roy, Prackrama Bahoo of Ceylon, Carrera of Central America, and Eustache of St. Domingo; we recognise men, though born of parents belonging to an inferior order of being, as contrasted with the European, who, in the exercise of mental powers at once brilliant and profound, and in the full possession of energies, as untiring as they were generally well directed, sought not only their own advancement but their country's good; and who, actuated by a love of honest independence, and a spirit of honorable emulation, endeavoured, with more or less success, to emancipate the oppressed, and promote the permanent and best interests of the community. Some objection may, perhaps, be rightly taken to *Carrera;* however, no one acquainted with his career in Central America can deny him great talents and courage, and some virtue. Now the individuals named were, one and all, descendants of the inferior races of mankind, as compared with the European; yet does the life of each one present us with facts of such a nature as plainly indicate the possession of talents and capabilities, and even virtues, which belong not to their progenitors, else than as an exception, but are characteristic in an eminent degree, of the highest branch of the Caucasian family of the human species.

The operation of the same law of nature which preceded and attended the creation of either Rammohun Roy or Eustache, &c., is alone necessary, in the well-formed and beautifully organized European, to the existence of all that is really great and good in man. Such can be alone required to realise either the luxuriant fancy of the poet, or the highest and best hopes and aspirations of the heaven-born philanthropist.

However, if the same physiological principles obtain in the vegetable as in the animal world, then are we bound to admit that the transmutation of a common marine plant into the cabbage, the transmutation of oats into barley, and even into wheat, authorise us to anticipate the creation, at some future time, of a *second* species of the genus Bimana, "*the highest type of animated being.*" (See "Natural History of "Creation," p. 369, third edition). "I have long held an opinion," says Sir M. Faraday, "almost amounting to conviction, in common, I believe, with many other lovers of "natural knowledge, that the various forms under which the forces of matter are made "manifest have one common origin; or, in other words, are so directly related and "mutually dependent, that they are convertible, as it were, and possess equivalents of "power in their action."

It should be borne in mind that the foregoing remarks take their spring from a philosophy which, to borrow the words of Dr. Wm. B. Carpenter, "*is stigmatised by "many as material and degrading*;" and Cowper, though a poet of a high order, fell, unhappily, into the same kind of error as the "many" alluded to by Dr. Wm. B. Carpenter; he (Cowper) wrote in severe terms of those who would link the "soul" in any way with a material structure—with so "*mean an abode*" as is (as he affirmed) this body of ours. But since Cowper so wrote, we find that *truth* has made an important step in advance. Thus, in the "*Anecdotes of the life of Bishop Watson,*" we read—"When I went to the University I was of opinion, as most schoolboys are, that the soul "was a substance distinct from the body, and that when a man died—he, in classical "phrase, breathed out his soul; that it then went I know not whither, as it had come "into the body from I know not where or when, and had dwelt in the body during life, "but in what part of the body it had dwelt I knew not." It is added, "*This notion of "the soul was, without doubt, the offspring of prejudice and ignorance.*" Bishop Watson has written also—"Hoping as I do for eternal life, I am not disturbed at the "idea that the soul is or is *not* a substance distinct from the body." Another Bishop (Dr. Law) in his "*Theory of Religion*" denies that the word soul means anything immaterial, but affirms that the life hereafter is "*a second bodily existence.*"

The hard practical and material experiences of Messrs. W. Crookes and A. R. Wallace—including those of the late Professor de Morgan (President of the Mathematical Society of London), in what is miscalled "SPIRITUALISM," add law of heredity is of the first importance—and so it is I venture to impress on the reader of this article entitled, "Life and its Lessons," this same LAW. Oh, that it were heeded as it deserves; what happiness may be secured, what misery averted—not only in the present, but in the far off future. The following words quoted from the "Lectures on Man," of the late Sir WILLIAM LAWRENCE, published in the early part of this present century, are full of truth and beauty; and although the efforts of this famous writer, to add to the happiness of mankind, gained him a large amount of abuse and contumely—*(the every day fate of the pioneer in the good cause of progress)*—yet will such now command the attention of the best and wisest among us.

LAWRENCE writes thus—"The hereditary transmission of "physical and moral qualities, so well understood and familiarly "acted on in the domestic animals, is equally true of man. A "superior breed of human beings could only be produced by "selections and exclusions, similar to those so successfully employed "in rearing our more valuable animals, yet in the human species "where the object is of such consequence, the principle is almost "entirely overlooked. Hence all the native deformities of mind and "body which spring up so plentifully in our artificial mode of life, "are handed down to posterity, and tend by their multiplication "and extension to degrade the race of mankind.

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"If man, in the affair of marriage, were as much under manage- "ment as some animals are in the exercise of their generative func- "tions—an absolute ruler might accomplish in his dominions almost "any idea of the human form.

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"This attention to breed is not, however, of so much consequence "in the people as in the rulers, in those to whom the destinies of "nations are entrusted; on whose qualities and actions depend the

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much to the theory of the two Bishops here named.

To complete this reference to MULLER'S "*formative principle*," it may be added here that the said "interference," or "disturbance" of the same is rendered apparent in the creation—among many more—of such "monstrosities" as the *six fingered* and the *six toed children*; as well as that of the "*porcupine family*." The particulars of these curious abnormalities are to be found in the "*Lectures on Man*," by the late Sir W. LAWRENCE.

"present and future happiness of millions. Here, unfortunately, "the evil is at its height—laws, customs, prejudices, pride, bigotry, "confine them to intermarriages with each other; and thus degradation of race is added to all the pernicious influences inseparable "from such exalted stations. What result should we expect if a "breeder of horses or dogs were restricted in his choice to some ten "or twenty families taken at random, if he could not step out of "this little circle, to select finely formed or high spirited individuals? "How long a time would elapse before the fatal effects of this "inbreeding would be conspicuous in the degeneracy of the descendants? The strongest illustration of these principles will be found "in the present state of many royal houses in Europe. The evil "must be progressive if the same course of proceeding be continued."

The famous German physician, HALLER, records a very remarkable instance of two noble females, who got husbands on account of their wealth—"although they were nearly idiots." From these ladies the mental defect named extended for a whole century, into several families; "so that some of all their descendants still continue "idiotic, even to the fourth and even the fifth generation."

What a sad example is thus afforded us of the propagation of mental defects from the parent to the offspring. So surely does wrong doing claim its revenge. So surely does *guilt*, "*the avenging* "*fiend, follow close behind*," to "*punish those who err.*" The "*chain, which binds together guilt and pain*," may not be, cannot be broken.

The law of heredity is then shown to be "of the first importance"—inasmuch as it embraces whatever can appertain to the physique of man and animals; to say nothing here of the vegetable world. The same law it is which presides over and sustains the intellectual and moral capabilities of mankind. No bodily form, no kind of knowledge, no form of virtue, or of moral excellence—in a word, no quality or attribute, corporeal or mental, but owes its starting point or existence to this same law. The notorious facts of heredity, as LEWES observes, show us how, even the acquired habits of man and animals become transmitted to their descendants. Thus, "the unnatural action of begging, when a dog is taught to "perform it, may become a natural action in its descendants—"requiring no teaching." Nay, the very process underlies all development. The voluntary actions become involuntary, the involuntary become automatic, the intelligent become habitual, and the habitual become instinctive. It is the same in the higher regions of intellect; the slow acquisitions of centuries of research become condensed into axioms which are intuitions.

In the "*Spanish Gypsy*," GEO. ELLIOT asks—

"What, shall the trick of nostrils and of lips
"Descend through generations, and the soul
"That moves within our frames, like God in worlds,
"Imprint no record, leave no documents
"Of her great history?
"Shall men bequeath
"The fancies of their palates to their sons,
"And shall the shudders of restraining awe,
"The slow wept tears of contrite memory,
"Faith's prayerful labour, and the food divine
"Of past ecstatic;—shall these pass away
"Like wind upon the waters, tracklessly?"

Accepting then the teachings embodied in the preceding remarks, surely there is very much to hope for in the future of the human race. If it be true that we are now but in the childhood of the world—but on the threshold of civilization, are we not justified in the conclusion that the "vantage ground" above named, as the outcome of the law of heredity, will realize in the far off future the creation of a class of human beings superior in point of health, of beauty, of intellect, and of morals, to all those of the human family who shall have preceded the same. Furthermore, that this present form of existence—of which the poet writes as

"A life of error, ignorance, and strife,
"Where nothing is, but all things seem,"

will have ceased to be, will be unknown. At this time it is too evident that the same "error," "ignorance," and "strife," here named—the many pains, sufferings, and sorrows, now the lot of mankind, "*maketh*," as St. PAUL has it, "*only unto death*."

Few will deny that the responsibility is indeed with the few, to lead mankind on to the recognition of those great and abiding laws of nature, on which rests each successful endeavour to reach that intellectual pre-eminence which awaits mankind; and not the less to realize whatever is noble and truthful in regard to morality. Let, then, such few accept the same responsibility with that earnestness which becomes a great cause. Let them do their best to bring about that higher and purer life, which finds expression in these very eloquent lines of TENNYSON, viz. :—

> " Ring out the old, ring in the new,
> " Ring out the false, ring in the true,
> " Ring out the griefs that sap the mind,
> " Ring in redress to all mankind.
>
> " Ring out a slowly dying cause,
> " And ancient forms of party strife;
> " Ring in the nobler modes of life,
> " With sweeter manners, purer laws.
>
> " Ring out false pride in place and blood,
> " The civic slander and the spite;
> " Ring in the love of truth and light,
> " Ring in the common love of good."

Then, and not until then, will "*the solitary place be made* "*glad;*" and "*the desert blossom as a rose.*"

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